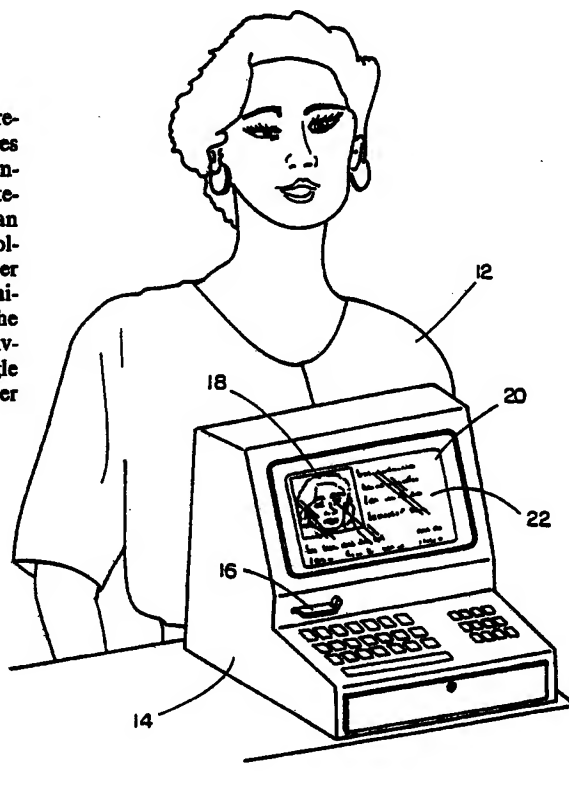




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : B42D 15/10	A1	(11) International Publication Number: WO 93/19942 (43) International Publication Date: 14 October 1993 (14.10.93)
(21) International Application Number: PCT/US93/03272 (22) International Filing Date: 7 April 1993 (07.04.93) (30) Priority data: 07/864,868 7 April 1992 (07.04.92) US 07/958,863 8 October 1992 (08.10.92) US (71) Applicant: INTELICARD TECHNOLOGIES, INC. [US/ US]; 1810 South 109th Street, Omaha, NE 68144-1821 (US). (72) Inventors: GRANGER, Ted, N. ; 1810 South 109th St., Omaha, NE 68144-1821 (US). ROBINSON, Timothy, Troy ; P.O. Box 702034, Tulsa, OK 74170 (US). WEB- ER, Eric, Bruce ; 2843 East 84th Street, Tulsa, OK 74137 (US). MULLICAN, Kenneth, R. ; 1903 East 81st Street, Apt. #A, Tulsa, OK 74136 (US).		(74) Agent: SUITER, Sean, Patrick; Henderson & Sturm, One Pacific Place, 1125 South 103rd Street, Suite 330, Oma- ha, NE 68124-1076 (US). (81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>
(54) Title: PROCESS AND SYSTEM FOR READING AND WRITING IMAGES AND RELATED DATA TO AN INTE- GRATED CIRCUIT CARD (57) Abstract A process and system for reading and writing images and re- lated data to an integrated circuit card wherein the process captures an image, compresses the captured image, and then stores the com- pressed image. The image may be written to the memory of an inte- grated circuit card along with other machine readable data. In an exemplary embodiment of the system an integrated circuit cardhol- der (12) may utilize an integrated circuit card (16) having his or her image (18) readable as a security measure from point-of-sale termi- nals (14), automatic teller machines, and the like. Additionally, the card (16) may contain all credit card data, bank account data, driv- ers license data, passport data, and the like. In this fashion a single highly secure card (16) may be issued and utilized by a cardholder (12) such that multiple dedicated cards become unnecessary.		



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NL	Netherlands
BE	Belgium	GN	Guinea	NO	Norway
BF	Burkina Faso	GR	Greece	NZ	New Zealand
BG	Bulgaria	HU	Hungary	PL	Poland
BJ	Benin	IE	Ireland	PT	Portugal
BR	Brazil	IT	Italy	RO	Romania
CA	Canada	JP	Japan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SK	Slovak Republic
CI	Côte d'Ivoire	LJ	Liechtenstein	SN	Senegal
CM	Cameroon	LK	Sri Lanka	SU	Soviet Union
CS	Czechoslovakia	LJ	Luxembourg	TD	Chad
CZ	Czech Republic	MC	Monaco	TG	Togo
DE	Germany	MG	Madagascar	UA	Ukraine
DK	Denmark	ML	Mali	US	United States of America
ES	Spain	MN	Mongolia	VN	Viet Nam
FI	Finland				

**PROCESS AND SYSTEM FOR READING AND WRITING
IMAGES AND RELATED DATA TO AN INTEGRATED CIRCUIT CARD**

Cross Reference to Related Applications

5 The present application is a continuation-in-part application of a United States Patent Application filed on 7 April 1992 and designated by Serial N^o 07/864,868.

Microfiche Appendix

 This application includes a microfiche appendix of eight microfiche comprising a total of 448 frames.

10 **Authorization Pursuant to 37 CFR 1.71(d) and (e)**

 A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent file or records, but otherwise reserves all copyright rights whatsoever. 15 Additionally, this patent document contains certain material proprietary to parties other than the inventive entity. This material is provided under license and may not be facsimile reproduced without the expressed written permission of the party having a proprietary interest in said material.

20 **Background of the Invention**

1. Technical Field

 The present invention is directed to integrated circuit cards and peripheral equipment and more particularly to process and system for storing data on an integrated circuit card.

2. Description of the Prior Art

Integrated circuit cards (IC cards) are typically comprised of a magnetic stripe credit card with an embedded computer chip in the left hand quadrant of the card. Communication with the computer chip may be made via a series of contacts located above the chip position.

During common operation, the IC card is inserted into a dedicated reader/writer which supplies the chip with necessary inputs and outputs. The reader/writer is connected to a host device (e.g., computer, point-of-sale terminal, automatic teller machine, public telephone, or the like) via a data communication link. In this configuration the host device may communicate with the IC card.

IC cards have been utilized in the prior art to maintain information regarding the card holder, the intended use of the card, copies of prior transactions (including status, and result and balance if applicable), or the like.

Ordinary magnetic stripe cards are capable of holding approximately 100 bytes of data on each of four tracks. In contrast, IC cards are capable of storing approximately 8000 bytes of data. While the IC card's improved data storage capacity allows additional cardholder and issuer features, IC cards still lack the necessary storage capacity to store high resolution images, or the like.

Currently, security on ordinary magnetic card stripes is limited to methods of encoding the data magnetically on the stripe. Conversely, IC cards utilize a family of passwords or keywords to limit data access in the chip based on the type of access required, privilege level of the requester, and terminal identification from which the request is being made.

Several industries are desirous of a fail-safe method of providing transaction level security in the use of credit type cards. These industries include, banking and finance, merchandisers, and travel and entertainment entities.

3. Objects of the Invention

Therefore, a principal object of the present invention is to provide an improved process and system for reading and writing images and related data on an integrated circuit card.

Another object of the present invention is to provide a process and system for reading and writing high resolution images in a compressed format on an integrated circuit card.

5 Another object of the present invention is to provide a fail-safe security measure for integrated circuit cardholders and card issuers.

Another object of the present invention is to provide a process and system for reading and writing images and related data on an integrated circuit card which requires a relatively small amount of useable card memory to store an image or images.

10 Another object of the present invention is to provide a process and system for reading and writing images and related data on an integrated circuit card which is dependable, easy to use, and cost effective.

Another object of the present invention is to provide a process and system for reading and writing images and related data on an integrated circuit card which may be used in existing systems with relatively little modification.

15 Finally, another object of the present invention is to provide a process and system for reading and writing images and related data on an integrated circuit card which is easy to install and trouble free. These and other objects will be apparent to those skilled in the art.

20 **Summary of the Invention**

The present invention discloses a novel process and system for reading and writing images on an integrated circuit card. The process captures an image, compresses the captured image, and then stores the captured and compressed image. The compressed image may be written to the memory of an integrated circuit card along with other machine readable data.

25 In an exemplary embodiment of the system an integrated circuit cardholder may utilize an integrated circuit card having his or her image readable for identification from point-of-sale terminals, automatic teller machines, and the like. Additionally, the card may contain credit card data, credit history, bank account data, drivers license data, passport data, and the like. In this fashion a single highly secure card may be issued and utilized by a cardholder such that multiple dedicated cards become unnecessary.

30

Brief Description of the Drawings

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

5 Figure 1 is a perspective view of a preferred embodiment of the process and system for reading and writing images and related data on an integrated circuit card showing a cardholder at a point-of-sale terminal adapted to read and write IC cards wherein the cardholder's image is displayed with other relevant data on the point-of-sale terminal display for
10 identification purposes;

 Figure 2 is a perspective diagrammatic illustration of a preferred embodiment of the process and system for reading and writing images and related data on an integrated circuit card illustrating the steps of writing an image to an IC card;

15 Figure 3 is a perspective diagrammatic illustration of a preferred embodiment of the process and system for reading and writing images and related data on an integrated circuit card illustrating the steps of reading an image from an IC card; and

 Figure 4 is a diagrammatic illustration of a preferred embodiment of the process and system for reading and writing images and related data on
20 an integrated circuit card illustrating the steps of an exemplary utilization of an IC card having a compressed image of the cardholder stored in the memory of the IC card.

 While the invention will be described in connection with a preferred
25 embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Description of the Preferred Embodiment

30 A preferred embodiment of the present invention 10 is illustrated in Figures 1 through 4. An exemplary embodiment of the present invention is best shown in the diagrammatic illustration of Figure 4. Figures 2 and 3 diagrammatically illustrate image writing and reading process steps for an exemplary embodiment. Figure 1 depicts a cardholder 12 at a point-of-sale

terminal 14 which is adapted to read and write IC cards 16 wherein the cardholder's image 18 is displayed with other relevant data 22 on the point-of-sale terminal display 20 for identification purposes.

5 In a preferred embodiment 10 a cardholder/purchaser 12 may utilize an IC card 16 which contains their image and relevant credit card account data to make purchases. A store clerk would simply ring-up the sale on a dedicated point-of-sale terminal and insert the IC card 16 into the terminal 14. The terminal could then debit the cardholder's account once the clerk had confirmed, through the displayed cardholder image, the identification of the
10 account holder. Likewise, in similar transactions, a cardholder 12 could utilize their IC card 16 at automatic teller machines. The cardholder's image would be read from the card by the automatic teller, and via a pattern recognition system, and the automatic teller could confirm the identity of the carholder's image with a real-time video image of the card user.

15 Turning now to Figure 2, wherein the exemplary steps of writing an image to an IC card 16 are shown, a Matrox Illuminator-16 is utilized to display an image on a video monitor. The image may come from a number of sources, i.e., video camera 24, VCR, laserdisk, still video camera, broadcast television, or a digitized scanner image. The displayed image may then be
20 saved to a file 26 (preferably as a 16-bit image). This file is then compressed so as to produce a compressed image file 30. Compression of the file 26 may be achieved via JPEG compression algorithms, Huffman encoding, or other data compression method. Other relevant data 22 (i.e., credit card data, credit history data, bank account data, drivers license data, passport data, and the
25 like) may then be entered via a keyboard 28 and written to a data file 32. The compressed image file 30 and the data file 32 may then be written to the memory of an IC card 16 via an IC card reader/writer 34.

Turning now to Figure 3, wherein the exemplary steps of reading an image from an IC card 16 are shown, the compressed image file 30 may be
30 read from the IC card 16 via the IC card reader/writer 34. The compressed image may then be decompressed into an image file 26 and displayed on a point-of-sale terminal display 20 or the like.

Turning to Figure 4, wherein the exemplary steps of utilizing the invention to perform a security verification are shown, a video source 50

provides an image of the cardholder, or the like, via video sampling. Software designed for the video sampler reads and converts the image. Additionally, the video source 50 may be replaced by a flat surface image scanner.

5 The raw image 52 produced by the video source 50 contains all image data. The raw image 52 is processed by the image compressor 54. The image compressor 54 compresses the raw image 52 in four steps: (1) useable size image scaling, (2) color reduction to a subset of all possible colors, (3) image degradation, and (4) encoding. The compressed image 56 is then transmitted as the static information to be stored on an integrated circuit security card 58.
10 Other security information (static information such as I.D. numbers, or other fixed biographical information, as well as dynamic information such as last access dates, credit and debit amounts, or the like) may be initialized on the card 58. Communication, card formatting and security code enabling are normally provided by the security card 58 manufacturer.

15 The compressed image 56 may be virtual, and image acquisition/compression/transmission (for a security system) should not store information to disk so as not to compromise the security information at its source. However, if the total destruction of temporary information stored to disk can be assured, temporary information can be safely handled
20 on disk.

Reconstruction of image information consists initially of extracting image information from the card 58. Image reconstruction may in an exemplary embodiment only take place after any necessary pass codes have been entered by the user and by the system retrieving the information from
25 the card). In any case, the compressed image 56 may be decompressed via an image decompressor 60. The image decompressor 60 simply acts in the reverse of the image compressor 54.

Dependent on the application, the raw image 52 may be accompanied by any other security information stored on the card 58. Image data and any
30 other security information are presented to the user via a video display 62 or the like such that security verification 64 may be made.

While the invention has been described with a certain degree of particularity, it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the

spirit and scope of the disclosure. It is understood that the invention is not limited to the embodiments set forth herein for purposes of exemplification, but is to be limited only by the scope of the appended claims including the full range of equivalency to which each element thereof is entitled.

- 5 Thus, there has been shown and described an improved process and system for reading and writing images and related data on an integrated circuit card which accomplishes at least all of the stated objects.

WE CLAIM:

1. A process for reading and writing images and related data on an integrated circuit card, comprising:
 - (a) capturing an image;
 - 5 (b) compressing said image; and
 - (c) storing said image in a machine readable form on an integrated circuit card.
2. The process of claim 1, wherein said image is an image of the cardholder.
- 10 3. The process of claim 1, further comprising the step of decompressing said stored image and displaying said image via means for decompressing and displaying an image from an integrated circuit card.
4. The process of claim 1, wherein said compression comprises the steps of (i) scaling the image, (ii) reducing the color of the image, (iii)
15 degrading the color of the image, and (iv) compressing the image.
5. The process of claim 4, wherein said image scaling step is accomplished via a video signal reduction algorithm.
6. The process of claim 4, wherein said color reducing step decreases the number of colors used in the image.
- 20 7. The process of claim 4, wherein said degrading step removes portions of the image which are not necessary for viewing and comprehending the image.
8. The process of claim 4, wherein said compression is accomplished via Huffman encoding.
- 25 9. A system for writing images and related data on an integrated circuit card, comprising:
 - (a) image capture means for generating image data for digital storage;
 - (b) image conversion means for controlling said image capture
30 means and for storing said captured digital image;
 - (c) image compression means for compression said captured digital image; and
 - (d) an integrated circuit card for storing said captured and compressed digital image.

10. The system of claim 9, further comprising means for decompressing and reading said captured and compressed digital image stored on said integrated circuit card.

11. The system of claim 9, wherein said image captured by said
5 image capture means is an image of the cardholder.

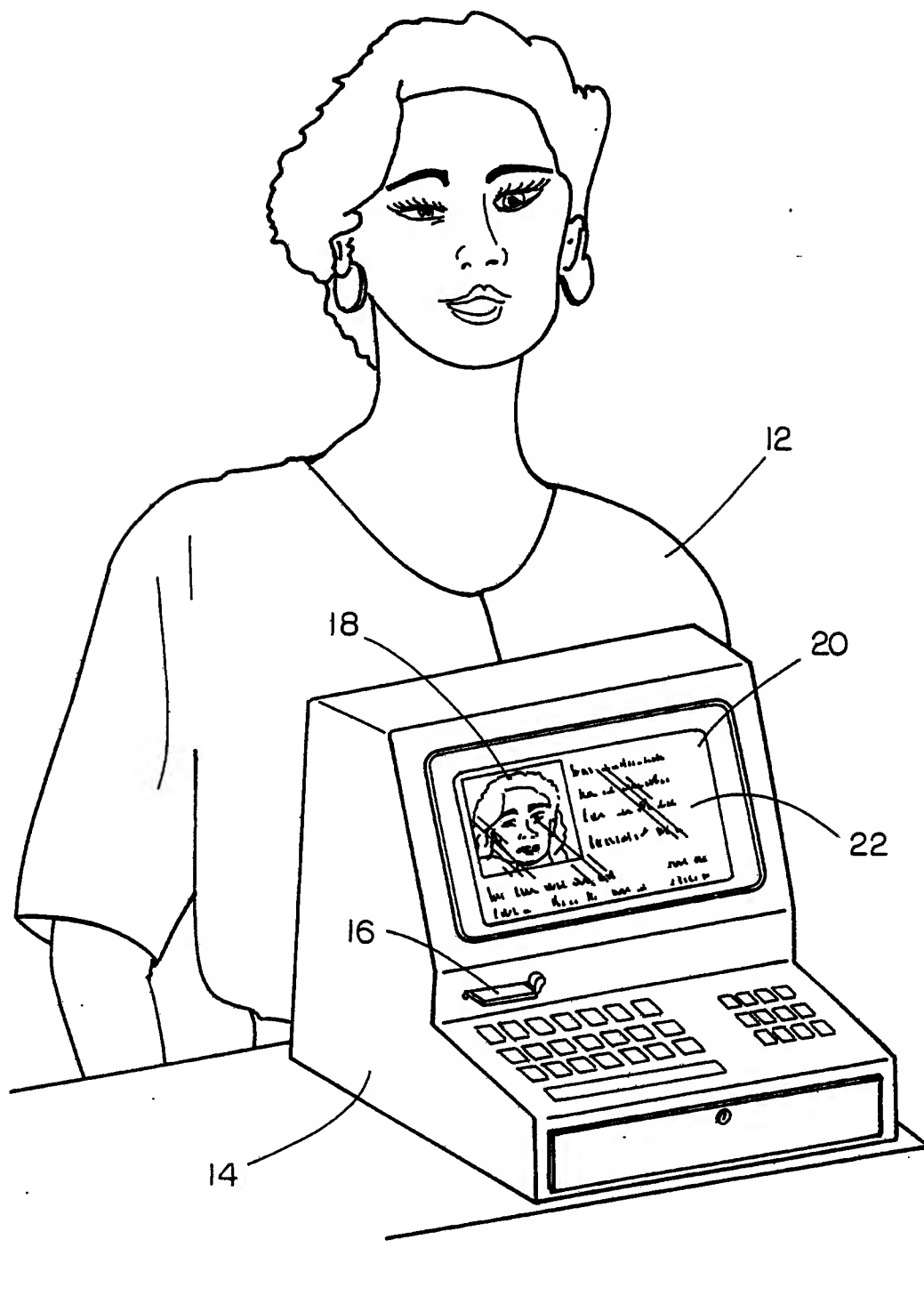


FIG. 1

SUBSTITUTE SHEET

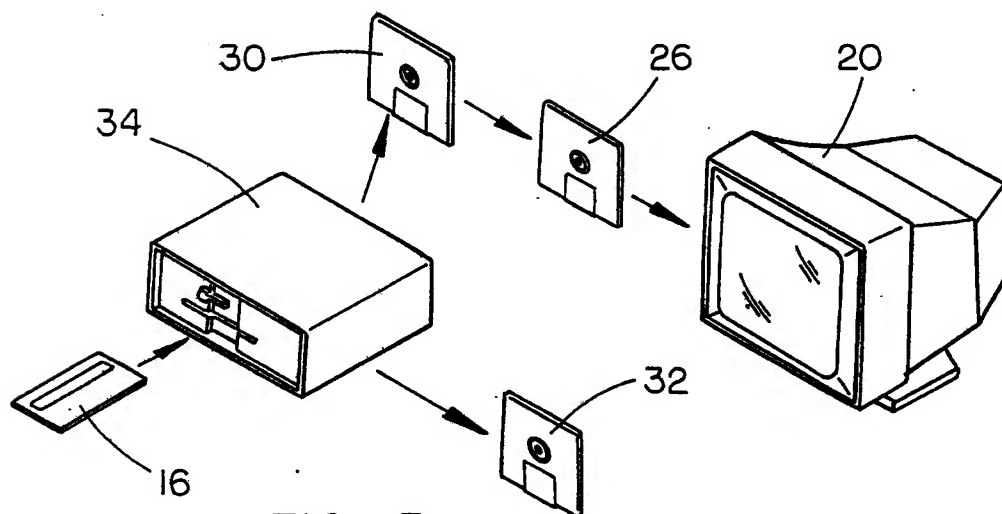
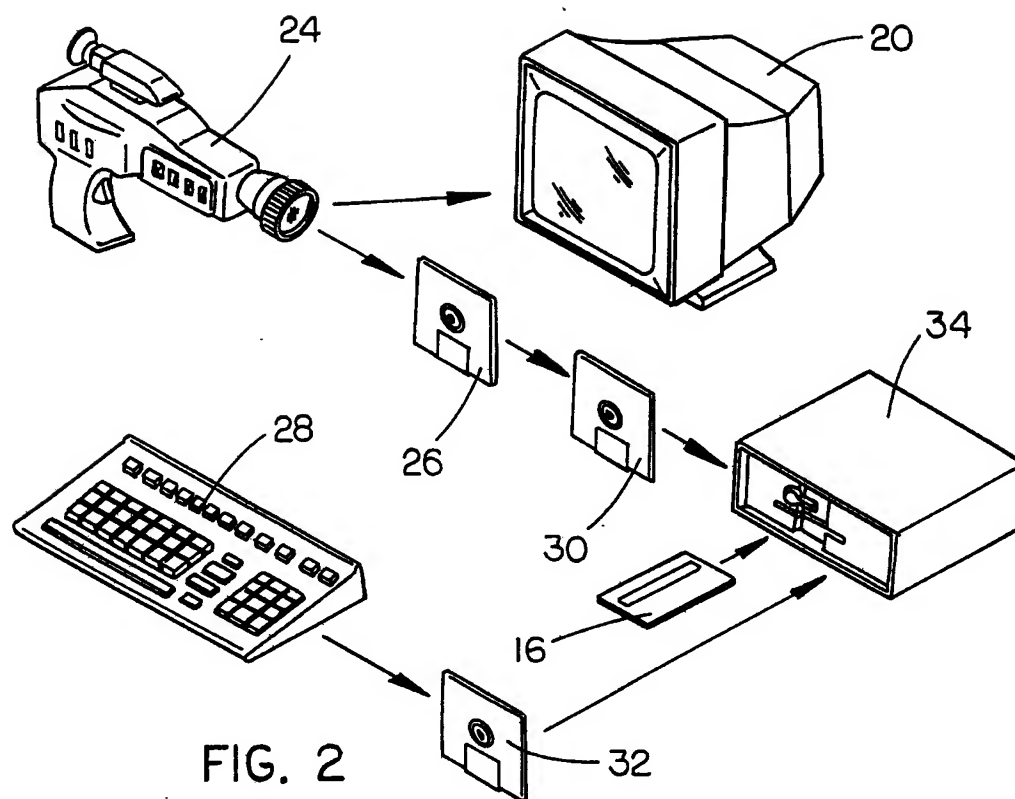


FIG. 3

SUBSTITUTE SHEET

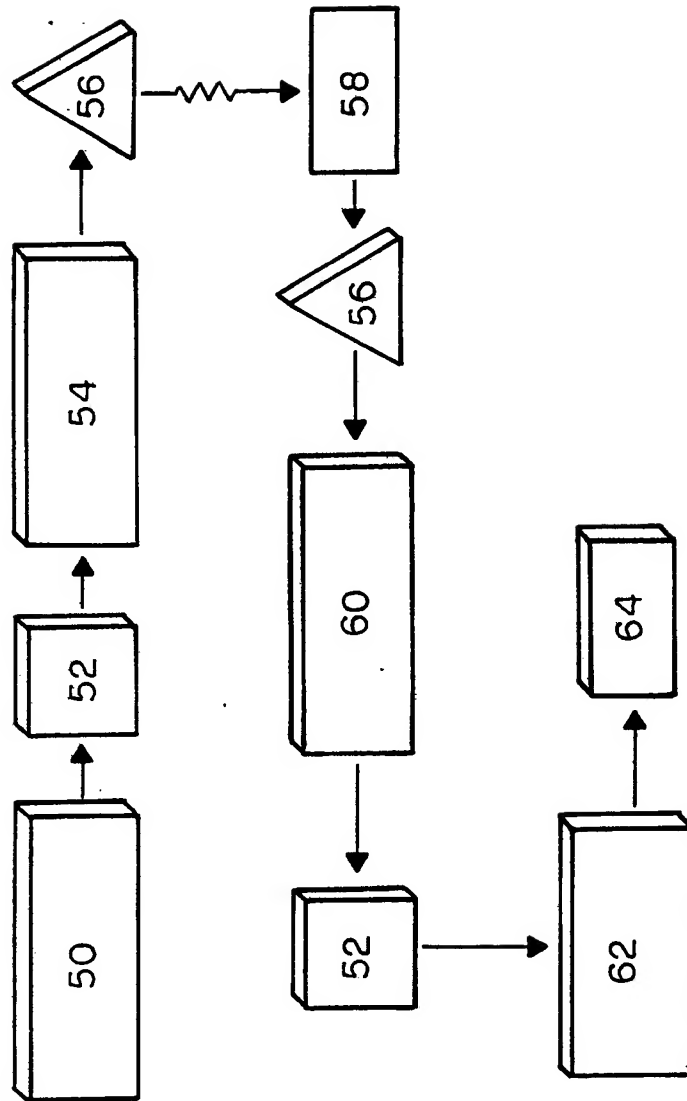


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/03272

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) : B42D 15/10

US CL : 382/002; 283/904; 235/380,382

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 382/002; 283/904; 235/380,382

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
None

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US, A, 5,027,401 (Soltesz) 25 June 1991 see column 3, lines 31-47 and column 5, line 65 to column 6, line 23.	<u>1-3, 9-11</u> 4-8
Y A	US, A, 4,900,902 (Sakakibara) 13 February 1990. see whole document; column 2, lines 32-35.	<u>8</u> 1-11
Y	US, A, 4,754,487 (Newmuis) 28 June 1988 see column 3, lines 16-27, 55-61; column 6, lines 24-33; column 7, lines 10-29.	1-11
X A	US, A, 4,712,103 (Gotanda) 08 December 1987 see column 5, lines 20-35; column 6, lines 10-16, whole documents.	<u>1-2, 9, 11</u> 1-11

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	
A document defining the general state of the art which is not considered to be part of particular relevance	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
E earlier document published on or after the international filing date	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	*R* document member of the same patent family

Date of the actual completion of the international search 21 JUNE 1993	Date of mailing of the international search report AUG 17 1993
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer STEVEN P. KLOCINSKI
Facsimile No. NOT APPLICABLE	Telephone No. (703) 305-4941

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US93/03272**C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,991,205 (Lemelsan) 05 February 1991 see whole document.	1-11
A	US, A, 4,554,591 (Kec) 19 November 1985 see whole document.	1-11